PATENT CLAIMS

1. The thermal hydro-machine on hot gas with recirculation (Figures 3, 4 and 5) for the heat energy conversion into the mechanical work consists of relatively turnable characteristic assembly I composed of: the mobile rotational heat exchanger made by a set of independent partial segment collectors (1), arranged in the form of a cylinder's shell and connected in continuation with a pair wise segment working cylinders and belonging free pistons (2), or alternatively with segment working chambers having elastic membrane (2'), where under a greater pressure there is the independent working gas in the closed space; directed channels (3) for the recirculation incompressible medium, which start on the exit from segment working cylinders (2) or, alternatively, from segment working chambers (2'), and continue semi circularly in the form of concentric narrowing curved channels towards the centre of working vane wheel (8); widening return curved recirculation channels (4) for the working and useless circulation of the recirculation medium; widening return curved excepting channels (5) for excepting the recirculation medium towards working segment cylinders (2) or, alternatively, towards segment working chambers (2'); mobile vanes (6) or, alternatively, axially moved closers (6') for the adjusted closing and opening of return excepting channels (5) and teething (7) connected on the outer casing of segment cylinders (2) or, alternatively, of working chambers (2') in the form of inscribed circle; of working-turnable characteristic assembly II composed of: working wheel (8) with curved turbine vane channels, inside of which the pressing hydrodynamic flow is converted by means of the recirculation incompressible medium into the turnable mechanical work of working wheel (8); exit working shaft (9) on which working wheel (8) is firmly fastened; driving transmitter (10) for the relative motion of assembly I also firmly fastened onto working shaft (9); of mechanical intermediate transmitter of assembly III composed of the driven pair of intermediate transmitters (11) eccentrically set with respect to working shaft (9) coupled on teething (7) and on driving transmitter (10) for accomplishing the opposite relative motion of assembly I, which embracing carrier (12) keeps the freely embedded shaft with intermediate transmitter (11) on the eccentric distance from working shaft (9) and rigidly fastened to machine casing or stand (13).

2. The thermal hydro-machine on hot gas with recirculation according to claim 1, **characterized by** that by means of the working gas and the incompressible recirculation medium, by conducting-to the heat to the working gas via a part of the relatively moving rotational heat exchanger (1) in the hot space and simultaneously conducting-away the heat from the working gas via the remaining other part of the relatively moving rotational heat

exchanger (1) in each segment cylinder (2) or, alternatively, in each working chamber with elastic membrane (2'), it enables a real, continued, repeatable and unique right-turning, circular thermodynamic cycle (curves „a" and „b") for converting the thermal energy into the mechanical work with the following ideal state changes of the working gas presented in p – v and T – s diagrams (Figure 1 and 2): the isothermal compression (1 - 2) at the heat conducting-away in the cooled space, the isobaric expansion (2 - 3) at the heat conducting-to in the hot space, the isothermal expansion (3 - 4) at the heat conducting-to in the hot space and the isochoric heat conducting-away (4 - 1) in the cooled space.

3. The thermal hydro-machine on hot gas with recirculation according to claims 1 and 2, **characterized by** that it accomplishes a slower relative motion of the relatively turnable characteristic assembly I with belonging elements (1, 2, 3, 4, 5, 6, 7) in relation to the opposite, quicker main working rotation of turbine working wheel (8) and working shaft (9) on characteristic assembly II, with a mutually good adjusted transmission ratio of the mechanical transmitter, achieved between driving gear wheel (10) on assembly II, driven pair of inter-gear wheels (11) on assembly III and teething (7) on assembly I, by which the optimum, continuous and simultaneous, mostly isothermal heat conducting-to to the working gas from the source and the isothermal heat conducting-away from the working gas in the cooled space is enabled, as well as almost the entire heat self-regeneration at the shorter not-isothermal state changes of the indicated circular cycle (Figure 1 and 2), without using the additional thermal characteristic assemblies, batteries or heat regenerators.

4. The thermal hydro-machine on hot gas with recirculation according to claims 1, 2 and 3, **characterized by** that by means of the pressing working, return useless and return suction excepting vortex less hydrodynamic flow of the incompressible recirculation medium between the working free pistons in segment cylinders (2) or, alternatively, between the elastic membranes in segment working chambers (2') the adjustable catalytic hydrodynamic connection between the hot and cooled space is achieved without any significant time phase shift between a set of expansions and a set of compressions of the working fluid, although each of them for itself is in a certain cylinder stage without additional thermal characteristic assemblies and devices (such as: the battery and heat regenerator, gas transmitter or the rigid lever mechanism), which are substantially the same assemblies or elements with several substituting functions, converting the heat into the work immediately in the best possible way by such an intensity that is offered by the thermal source and the cooled space.

5. The thermal hydro-machine on hot gas with recirculation according to claims 1, 2, 3 and 4, **characterized by** that it contains the return curved recirculation channels (4) for the working and useless recirculation incompressible medium, which start at the exit from working wheel (8), getting wide arch wise towards the periphery and connected with directed channels (3) on the periphery, which are substantially the same channels for the working and useless flow and which function is determined by the relative position in relation to the heat source or the cooled space.

6. The thermal hydro-machine on hot gas with recirculation according to claims 1, 2, 3, 4 and 5, **characterized by** that it contains return curved channels for exertion (5) of the recirculation incompressible medium, which start at the exit from working wheel (8), getting wide arch wise towards the periphery and connected on segment working cylinders (2) or, alternatively, segment working chambers (2'), which are substantially the same channels which function is determined by the relative position with respect to the cooled space.

7. The thermal hydro-machine on hot gas with recirculation according to claims 1, 2, 3, 4, 5 and 6, **characterized by** that it contains arch wise movable vanes (6) on the entrance of return excepting channels (5), which, due to the difference between the higher expansion pressure of the working gas in hot segment cylinders (2) or, alternatively, in hot segment working chambers (2') and the significantly lower compression pressure of the working gas in cooled segment cylinders (2) or, alternatively, in cooled segment working chambers (2'), open return excepting channels (5), accomplishing the role of non-return valves and in such a way directing a part of the recirculation incompressible medium towards the cooled segment cylinders (2) or, alternatively, towards the cooled segment chambers (2') for filling the emptied space just as much as it is squeezed out from hot segment cylinders (2) or, alternatively, from hot segment chambers (2').

8. Thermal hydro-machine on hot gas with recirculation according to claims 1, 2, 3, 4, 5 and 6, **characterized by** that it contains axially movable closers (6') for closing the exits of return excepting channels (5) in the hot part or for opening the exits of return excepting channels (5) in the cooled part of the machine, which are rigidly fastened onto the freely mobile pistons in working cylinders (2) or, alternatively, onto the elastic membranes in segment working chambers (2'), directing a part of the recirculation incompressible medium towards cooled segment cylinders (2) or, alternatively, towards cooled segment chambers (2')

for completing the emptied space just as much as it is squeezed out from hot segment cylinders (2) or, alternatively, from hot segment working chambers (2').